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EXTRACT FROM A PAPER,
By J. v. LIEBIG,
ON THE CONSTITUENTS OF THE FLUIDS
OF MEAT.

Translated from the Original,

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IN a late number of THE MEDICAL PRESS (see page 164), I gave a translation of a recent paper by Baron von Liebig on the introduction into commerce, and on the applications of the "Extractum Carnis" described by him many years previously, in the commencement of which paper the distinguished author referred, for the mode of preparing the extract in question, to the 62nd volume of the *Annalen der Chemie und Pharmacie* (Heidelberg, C. F. Winter, 1847, page 257). In the latter volume is to be found, in fact, an elaborate article by the Baron on the "Constituents of the Fluids of Meat," from the concluding portion of which I now translate the following :*—

"From the above-described behaviour, the best process for preparing, in the short space of a few minutes, the strongest and most aromatic soup, is at once evident, and any one can, by the simplest experiments, satisfy himself of the truth of Proust's statement, that the constituents of the soup, on which its taste and its other properties depend, exist ready formed in the meat, and are by no means the product of cooking.

* For the opportunity of doing this I am indebted to the kindness of Dr. Sullivan, who has been good enough to procure for me, from the library of the Museum of Irish Industry, the 62nd volume of the *Annalen*, which was not to be met with in three of our public libraries which I had searched for it.—W. D. M.

"If one pound of lean beef, free from fat and bone, finely chopped as when used in sausages, be equably mixed with its own weight of cold water and slowly heated to the boiling point, the fluid being then, after boiling for some minutes, separated by expression through a napkin from the coagulated albumen and from the fibrin which has become hard and horny, we obtain an equal weight of the most aromatic broth, such as cannot be obtained even by boiling for hours from a piece of meat. Mixed with some salt and the other adjuncts with which soup is seasoned, and coloured somewhat darker with roasted onions or burnt sugar, this broth furnishes the best soup which can be prepared from a pound of meat. The influence which the (brownish) colour of the soup exercises on the taste, in consequence of the ideas connected with the colour, is easily proved. Soup coloured with a little caramel (roasted sugar), has, in the opinion of all persons, a much stronger taste than the same soup when not coloured, although the caramel, in fact, in no way enhances the taste.

"If we allow the meat to boil longer with the water, or evaporate the broth at a boiling temperature, it spontaneously acquires on concentration a brownish colour and a delicate taste of roast meat. If we evaporate it to dryness in a water-bath, or, if possible, at a still lower temperature, we obtain a dark-brown soft mass, of which half an ounce is sufficient to convert a pound of water, to which a little salt is added, into a strong and palatable soup.

"This extract of meat is not to be classed with the so-called soup or broth tablets prepared in England and France, for the latter are not made of meat, but consist of gelatin in a state of greater or less purity, which is distinguished from bone-glue only by its high price.

"From thirty-two pounds of lean beef, free from bone and fat (consisting of eight pounds of dry meat and twenty-four pounds of water), we obtain one pound of this extract, which, on account of its high price, can scarcely become an object of trade; but if the experience

of military surgeons agrees with that of Parmentier, according to which 'the dry extract of meat in the train of a corps, supplies the severely wounded soldier with a restorative, which, with a little wine, immediately raises his strength exhausted by great loss of blood, and enables him to bear being transported to the nearest hospital,'* it seems to me to be a pure matter of conscience to recommend Parmentier's and Proust's proposal to the attention of governments.

"Now, if the composition of this extract be somewhat more precisely known, any skilful apothecary can easily distinguish the genuine from the false preparation. Of the true extract of meat nearly 80 per cent. dissolve in spirit of wine of 85 per cent., while rarely more than from 4 to 5 per cent. of the ordinary soup tablets are dissolved by the same fluid. The amount of creatin and creatinin, which latter is immediately recognized in the spirituous solution by means of chloride of zinc, and the nature of the salts remaining after incineration, consisting principally of soluble phosphates, furnish sufficient resting points for estimating the goodness of the genuine extract.

"I consider this extract to be not less important for provisioning ships and fortresses, to preserve the health of the men in those cases where there is a want of fresh meat and vegetables, and where the men are dependent on salt meat.

"It is generally known that in salting meat the latter is rubbed and sprinkled with common salt, and that in the points where the meat and salt come in contact, a brine is formed, amounting to a third or to half of the fluid which formed a constituent of the fresh meat.

"I have found that this brine contains the principal constituents of a concentrated soup, that, therefore, in salting, the composition of the meat is altered, and in a still greater degree than occurs in cooking. In cooking, the highly nutritious albumen remains in a coagulated state in the meat, but in salting, albumen separates from

* See Proust, *Annales de Chimie et Physique*, 3rd series, t. xviii., page 177.

the meat ; from the brine when heated to the boiling point a quantity of albumen separates as a coagulum. The brine has an acid reaction ; it gives with ammonia, on the addition of a salt of magnesia, a copious preeipitate of ammoniaco-magnesian phosphate ; it contains lactic acid, a large quantity of potash, and that it contains creatin, which I was unable to separate from the great exees of common salt, may be undoubtedly inferred from the amount of creatinin present. Thus, the brine neutralized with lime yields, after the crystallization of the common salt, a ley, from which, after some time, on the addition of alcohol and then of chloride of zinc, the double salt of creatinin, which I have already frequently mentioned, is deposited.

“Hence, it is quite clear, that in salting meat, if the latter be rubbed so much that a brine is formed, a number of matters are withdrawn by the separation of the fluid of meat which are necessary to its constitution, and that in proportion to this loss its nutritive properties are impaired ; if these constituents are not replaced from other sources, it is evident that a portion of the meat becomes a respiratory matter certainly not conducive to health. It is further certain that by salted meat, if its quantity be not increased, the health of an individual cannot be permanently maintained, inasmuch as by its constituents, the parts of the body removed in the metamorphosis of tissue are not fully replaced, and the fluid diffused through the whole body (fluid of meat) is not kept in its normal composition. A change in the nature of the gastric juice, and consequently in that of the products of digestion, must be looked upon as a result of the long-continued use of salt meat, and if, during digestion, the matters which are indispensable to its progress are taken from other parts of the body, the latter must lose their normal condition.”



